REMARKS/ARGUMENTS

REMARKS

Claims 1-21 remain in this application. Claims 19-21 have been allowed. Claims 2, 3, 5, 10-15, 17 and 18 are indicated to be allowable if rewritten to avoid dependence from a rejected base claim. Claims 1, 4, 6-9 and 16 currently stand rejected as obvious over Beeson (US Pat. No. 6,600,597) in view of Forbes (US Pat. App. No. 2003/0174986).

Non-Obviousness

Applicants respectfully submit that the Examiner has not established a prima-facia case of obviousness because the Beeson and Forbes references are not properly combinable in the manner suggested by the Examiner. This is because there is no motivation to combine Beeson, the primary reference, when properly understood, with the secondary reference Forbes, and indeed, on close inspection, Beeson teaches away from combining Beeson with Forbes.

Beeson discloses a photonic crystal amplifier for an optical telecommunications system. While it is generally true that low-loss signal propagation (paragraph [008] of Forbes), cited by the Examiner as motivation to combine, is desirable in optical components, low-loss propagation is of little or no concern in amplifier devices such as that disclosed in Beeson. Note that Beeson has no disclosure of any desirability of low loss properties, or even of any loss properties. The emphasis is all on high gain, particularly on high gain per unit length. This is because in optical communication systems, low-loss propagation is generally a significant performance factor virtually everywhere except in amplifiers, for the very reason that the amplifiers are the devices that restore signal power and thus overcome, to the extent possible, the losses of the entire system.

The focus in amplifier design is generally on providing consistent gain, and not on providing low loss. This is evidenced by the wide disparity in attenuation at 1200nm, for example, between standard commercial erbium-doped optical amplifier fibers and standard commercial transmission fibers available today. The amplifier fibers typically have attenuation rates that are ten to thirty or more times greater than the transmission fibers, yet when optically pumped and used as amplifiers, these fibers are able to restore attenuated signals of the appropriate wavelengths by providing as much as 40dB or more of gain.

To one of ordinary skill in this art, there would be no particular motivation to use techniques designed to minimize loss within the high-gain device of Beeson, especially if the technique under consideration prevented the achievement of high gain in the first place.

Specific examination of Beeson shows that Beeson teaches away from a combination with Forbes for this very reason.

A principal aspect of the technology disclosed in Beeson is to provide "good overlap" of pump and signal wavelengths "through[out] the gain medium", and to maximize the "size of the gain medium" to provide "greater amplification per length of the gain medium." This is accomplished, according to Beeson, by providing a photonic-crystal based waveguide having a relatively large core diameter, in which both the signal and the pump wavelengths propagate as single modes, and in which the core is provided with gain. Concerning Beeson's emphasis on a large diameter gain medium, see, for example: the Abstract ("[t]he diameter of the gain medium is relatively large . . . ."); column 4, lines 6-7 ("[t]he diameter of the gain medium is relatively large"); column 5, lines 44-47 ("[b]ecause the diameter of the gain medium 12 is significantly larger than fundamental mode fibers, greater amplification can occur therein"); column 6, lines 9-10 (citing "the large mode fields available within the gain medium.") Beeson specifically distinguishes the large diameter gain medium of Beeson from prior devices that, according to Beeson, "suffer from poor performance because . . . the size of the gain medium is limited . . ." (column 3, lines 22-26).

From the teaching of Beeson, therefore, one of ordinary skill would be motivated to maximize the size of the gain medium, or the volume in which gain takes place, or, as Beeson states, to provide a gain medium having a "relatively large diameter." To somehow apply the use of a hollow-core light guide, such as the type disclosed in Forbes, in the context of the Beeson device not only would generally prevent the main central portion of the waveguide from being part of the gain medium, it would generally prevent the gain medium from having a "relatively large diameter" in the sense disclosed in Beeson, thus reducing the "amplification per length of the gain medium," directly contrary to the teaching of Beeson. Accordingly, Beeson itself teaches away from such combination.

For at least these reasons, the claims as pending are believed to be non-obvious and patentable over the art of record.

Conclusion

Based upon the above remarks, applicant believes the pending claims of the above-captioned application are in allowable form and patentable over the prior art of record. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Applicant believes that a three (3) month extension of time is necessary to make this Response timely, and a Request for such is submitted herewith. Should the Request be in error, applicant respectfully requests that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this Reply timely, and hereby authorizes the

Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

Please direct any questions or comments to Greg Bean at 607-974-2698.

Respectfully submitted,

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